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(54) Title: CAMERA NETWORK COMMUNICATION DEVICE

(57) Abstract

A communication device for interconnecting a digital camera to a communication network for downloading data to a remote computer. The device has a network communication port for establishing communication with a network via a pre-defined protocol and communication mode, and has a camera communication port such as a serial, parallel, SCSI, USB or Irda-port that imitates the back end application of a PC, for connection to a digital camera for sending and receiving data to and from the camera. The camera communication port is also used for input of programming and setup data to the communication device from a PC. The device can be programmed to operate on the data directly, such as in the case of data for storage or operational direction, and/or direct the data to the camera. The device may also have a Smart card socket into which a user can insert a card to input data, such as user and camera I.D., user authorization, image marking, camera operational parameters, remote computer/destination address, etc. The device can be programmed to perform encryption, authentication, watermarking and fingerprinting procedures, as well as structuring the data for transmission over a particular network, and to automatically perform operations, such as at specific times or in response to data input.

CAMERA NETWORK COMMUNICATION DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to digital still and video cameras and communication systems, and more particularly to a communication device providing a communication interface between a digital camera and a network system.

Brief Description of the Prior Art

Portable digital cameras are generally treated as PC peripheral devices. With conventional digital cameras, a user takes pictures until the camera memory/disk is filled and then downloads the digital image data to a PC. The camera needs to be either connected to the PC, for example through a cable, or a removable storage device such as a PCMCIA card must be manually transferred from the camera to the PC. The need to regularly make a direct, physical connection to a PC reduces the portable nature of digital cameras. In addition, downloading images to a PC is a local operation. In order to move images into the internet, the user must apply another set of commands on the local PC. Such a system is described in U.S. Patent No. 5,475,441 by Parulski et al. Cameras are also incorporated into integrated systems for displaying an image, such as a visual surveillance system in a retail store. U.S. Patent No. 5,444,483 by Maeda discloses a system including a digital camera with processing circuitry for display on a television screen.

Another limitation of conventional digital cameras is that there is no direct way to identify an image once it is loaded onto the PC. Additional information must be added manually, such as operator name, account number, camera of origin, etc. Also, there is no way of securing the images to assure that an operator does not alter them once loaded into a PC, or that the images will not be viewed by an unauthorized person as part of the transmission of the images from the PC to a remote location.

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SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an apparatus to serve as an interface for enabling a user of a portable still and or video digital camera to send image data directly from the camera to a communication network for transmission and downloading to a remote network location or remote computer.

It is a further object of the present invention to provide an apparatus enabling a user of a conventional digital camera designed to only download directly to a PC, to send camera data directly from the camera to a communication network for transmission and downloading to a remote network location or remote computer.

It is a still further object of the present invention to provide an apparatus that performs operations to secure the camera data against unauthorized use during transmission through an insecure communications network, and storage in an otherwise unsecure remote destination.

It is a still further object of the present invention to provide an apparatus for downloading image data from a variety of digital cameras to a remote computer through a selected communication network by means of an interface selected from a group, including but not limited to a modem, an ethernet adapter, a router, a hub, or infrared and other wireless connection.

It is another object of the present invention to provide an apparatus that can receive and encrypt and/or mark image data from a camera and transmit the encrypted/marked data to a remote computer.

It is another object of the present invention to provide an apparatus that can receive image data from a camera and transmit the data to a remote computer along with additional annotation data including but not limited to time and date, user information, location information, and camera information.

It is an object of the present invention to provide an apparatus for connecting a digital camera output to a remote computer, the apparatus being responsive to a Smart Card to

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1 program the apparatus and the camera, and to allow an authorized
2 user to operate the apparatus.
3   It is another object of the present invention to provide an
4 apparatus for use with a digital camera, that can control the
5 camera by means of programming, or in response to
6 information/direction from a remote computerized destination.
7   It is another object of the present invention to provide an
8 apparatus for use with a digital camera, that can be programmed by
9 a PC using the same interface on the apparatus that would later be
10 used to communicate with the camera.
11   It is a still further objective of the present invention to
12 provide a still and or video digital camera capable of downloading
13 image data to a remote computer through a selected communication
14 network by means of an interface selected from the group including
15 but not limited to a modem, an ethernet adapter, a router, a hub,
16 or infrared or other wireless connection.
17   It is another objective of the present invention to provide a
18 digital camera, and a device for use with a digital camera, that
19 automatically performs operations dependent on camera or device
20 programming, or in response to information/direction from a remote
21 computerized destination.
22   It is another object of the present invention to provide an
23 apparatus for use with a digital camera, that can control the
24 camera by means of programming, or in response to
25 information/direction from a remote computerized destination.
26   It is another objective of the present invention to provide
27 an apparatus for use with a digital camera, that can be programmed
28 by a PC using the same interface on the apparatus that would later
29 be used to communicate with the camera.
30   It is a still further objective of the present invention to
31 provide a still and or video digital camera capable of downloading
32 image data to a remote computer through a selected communication
33 network by means of an interface selected from the group including
34 but not limited to a modem, an ethernet adapter, a router, a hub,
35 or infrared or other wireless connection.
36   It is another objective of the present invention to provide a
37 digital camera, and a device for use with a digital camera, that

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1   automatically performs operations dependent on camera or device
2   programming, or in response to information/direction from a remote
3   computerized destination.
4   Briefly, a preferred embodiment of the present invention
5   includes a communication device for interconnecting a digital
6   camera to a communication network for downloading data to a remote
7   computer.   The device has a network communication port for
8   establishing communication with a network via a pre-defined
9   protocol and communication mode, and has a camera communication
10 port such as a serial, parallel, SCSI, USB or Irda-port that
11 imitates the back end application of a PC, for connection to a
12 digital camera for sending and receiving data to and from the
13 camera.   The camera communication port is also used for input of
14 programming and setup data to the communication device from a PC.
15 The device can be programmed to operate on the data directly,
16 such as in the case of data for storage or operational direction,
17 and/or direct the data to the camera. The device may also have a
18 Smart card socket into which a user can insert a card to input
19 data, such as user and camera I.D., user authorization, image
20 marking,   camera   operational   parameters,   remote
21 computer/destination address, etc.   The device can be programmed
22 to   perform   encryption,   authentication,   watermarking   and
23 fingerprinting procedures, as well as structuring the data for
24 transmission over a particular network, and to automatically
25 perform operations, such as at specific times or in response to
26 data input.
27   An advantage of the present invention is that a digital
28 camera user can download image camera data to a remote computer or
29 network site and therefore avoid the concern of the need to
30 connect the camera or its removable device to a local computer in
31 order to perform such operation.
32   Another advantage of the present invention is that it gives
33 the camera user the capability of automatically securing the
34 camera data, for example by encrypting or marking the data prior
35 to sending it over a communication system and downloading it to a
36 computer.
37   Another advantage of the present invention is that it adds

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1   functionality to cameras that are not designed specifically to
2   perform the task of connection to a remote network.
3   A further advantage of the present invention is that it
4   provides an apparatus with a connection to a camera that is
5   programmable for customized operations.
6   Another advantage of the present invention is that it
7   provides an apparatus that enables a user to send data from a
8   digital camera through a network to a plurality of destinations of
9   a variety of types, such as network printers and remote archives.
10
11   IN THE DRAWING
12   Fig. 1 illustrates the communication device of the present
13   invention interconnected to a camera and communication network;
14   Fig. 2 illustrates a device that connects to a camera through
15   a removable card interface;
16   Fig. 3 is a block diagram of the communication device;
17   Fig. 4 illustrates the communication device connected to a
18   network through one or more types of network connections;
19   Fig. 5 illustrates a communication device connected to more
20   than one network;
21   Fig. 6 demonstrates various ways of interconnecting the
22   communication device to a camera;
23   Fig. 7 summarizes various programming and operational
24   options;
25   Fig. 8 summarizes various operations that the communication
26   device can perform on images;
27   Fig. 9 shows an alternate embodiment wherein the
28   communication device is integrated with a camera;
29   Fig. 10 illustrates an embodiment of the present invention
30   wherein a communication device is configured for connecting data
31   from a camera directly to a video/TV receiver;
32   Fig. 11 illustrates a communication device configured for
33   sending different data to separate destinations;
34   Fig. 12 illustrates a communication device configured for
35   distinguishing two sets of data and sending one set to one
36   location and another to a second location.
37   Fig. 13 illustrates a plurality of cameras each communicating

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1   through a communication device to a single destination;

2   Fig. 14 is a flow chart illustrating automation related to

3   the communication device;

4   Fig. 15 is a flow chart illustrating automation related to

5   the destination device;

6   Fig. 16 presents summaries of types of data that can be sent

7   from the destination to the communication device, and processing

8   that can be done by the destination; and

9   Fig. 17 is a flow chart illustrating automation in a camera

10   having a built-in communication device.

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12   DESCRIPTION OF THE PREFERRED EMBODIMENT

13   Referring now to Fig. 1 of the drawing, a preferred

14   embodiment of the communication device 10 of the present invention

15   is illustrated in use with a digital camera 12, PC 14,

16   communication network 16 and a remote destination 18, which can be

17   any type of network object, such as a PC, a printer, phone switch,

18   server, etc. The device 10 has a camera communication port 20 for

19   interconnection to either the camera 12 as indicated by cable 22

20   to port 24, or to the PC 14 through cable 26. The dashed lines 28

21   are to indicate that either the camera 12 or PC 14 can be

22   connected to port 20. The device 10 has a network communication

23   port 30 shown connected to the network 16 through line 32, and a

24   Smart card port 34 for installation of a Smart card 36. The

25   connection between the remote destination 18 to the network 16 is

26   indicated by line 38. The communication device 10 includes any of

27   various communication or network apparatus for sending data

28   through the network 16.

29   The use of the communication device 10 involves first

30   programming it as required. Programming is accomplished through

31   use of a PC 14 connected to port 20 and/or through data entry from

32   the Smart card 36 through the port 34 and/or from a remote

33   computer at destination 18 by way of the network 16. Examples of

34   programming options will be given in the following detailed

35   description. Generally, the device 10 can be programmed to send

36   instructions and data to the camera and to perform operations on

37   data received from the camera, and to send data to the specified

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remote destination 18 by way of the network 16. Typical uses of
the Smart card are for entry of additional data such as a user
I.D., camera ID, an address or phone number of the remote
destination/network site 18, operational instructions to the
camera 12 and communication device 10, etc.

The primary function of the communication device 10 is to
perform the necessary operations required to receive data from the
camera 12 and then to send the data to the remote destination 18
by way of a selected communication media indicated by network 16.
Other operations/functions will be described in the following
specification.

The input 20 of the device 10 imitates the back end
application of a PC, thus becoming transparent to the camera that
operates as if it is communicating to a PC. The communication
device 10 establishes communication with a network 16 via a pre-
defined protocol and communication mode. The device 10 receives
image data and other information data from a camera 12, and
secures the data and structures it according to the required
protocol, performs any other programmed operations, and then sends
the data through the network for transmission to a destination
device 18, such as a computer, printer, server, phone switch,
etc., placing the data in assigned locations as defined by the
device ID or commands. Communication between the device 10 and
the destination device can be bi-directional, i.e. a destination
device host 18 can download information to the communication
device 10 as well as receive information. Any and all types of
media are included in the spirit of the present invention.
Particular embodiments of the communication device 10 include the
functions of one or more devices including a telephone modem,
ethernet adapter, a router, hub, etc. The device 10 can also be
configured to transmit through a wireless communication link, such
as satellite communication, etc. Signals include infrared, or any
RF frequency such as UHF, VHF, or microwave.

In wireless communication between the device 10 and
destination 18, line 32 is replaced with a wireless connection
between the device 10 and the network 16, as indicated by
antenna/emitter 40 on the communication device 10 and transceiver

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1 42 connected to the network 16.

2   Fig. 1 also shows wireless communication between the camera
3 12 and communication device 10, indicated by a transceiver 44
4 connected to the camera port 24, and an antenna/emitter 46 on the
5 communication device 10 for sending and receiving data between the
6 camera 12 and device 10.   All types of radiated signals are
7 included in the spirit of the invention, the particular type
8 depending on such factors as distance and environment, etc.

9   Because the device 10 is programmable, there is significant
10 flexibility in its use.   For example, device 10 can be programmed
11 to   perform   functions   automatically,   for   example   to   receive
12 instruction from a destination device/host computer 18 to direct
13 the camera to take a picture at a particular time of day, or every
14 hour and/or to download images or upload information at a specific
15 time from the camera.   The device 10 can be programmed by a
16 destination device 18 to operate a camera "off-line".   After
17 uploading the instruction to the device 10, the communication can
18 be terminated.   The device 10 can keep the instructions and send
19 them to the camera appropriately.

20   In another example, the device 10 can be programmed to
21 automatically connect to the network 16 when the camera image data
22 storage is full, or partially full, and then to download the image
23 data and subsequently disconnect from the network 16.   Upon
24 completion of downloading and receiving a confirmation from the
25 destination 18, the device 10 can continue by deleting the image
26 data from the camera.

27   The communication device 10, or camera if it is programmable,
28 can also be loaded with information to accompany an image, and
29 this information can be included, for example, in an image header.
30 Examples of valuable information may include an account number and
31 a camera ID.   The device 10 can be programmed to automatically
32 include this information with image data downloaded to a
33 destination.   Such identification avoids confusion as to the
34 source of the image.

35   The communication device is designed with selected features
36 permanently programmed.   An alternate embodiment of the present
37 invention includes permanent programming to allow downloading of

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1   data only to a specific destination. Such fixed programming helps
2   avoid theft of the device or camera for a different use. In
3   general, it is a specific feature of the present invention to
4   provide a device with permanent programming for any specific
5   purpose.

6   Another alternate embodiment includes fixed programming to
7   automatically request and receive a camera ID from the destination
8   device 18, and/or smart card 36 when connected to either of these.
9   The camera ID is then included along with image data. A still
10 further embodiment includes permanent programming to read and
11 increment a counter and assign a unique number to each image
12 received. In this way each image has associated with it a unique
13 number, and the ID of the camera that secured the image. The
14 programming for these functions will be understood by those
15 skilled in the art, and is not shown. The required clock,
16 counter, ROM and other necessary circuit components are
17 illustrated in block form in Fig. 3. In an embodiment wherein the
18 communication device is integrated with a digital camera, the
19 camera ID is programmed into ROM, and therefore no additional
20 request or receiving of a camera ID is required. The operation of
21 including an image number is accomplished in the same manner as
22 with the separate communication device. The integrated camera and
23 communication device will be more fully described in the following
24 text in reference to Fig. 9 of the drawing.

25   Other embodiments of the communication device 10 include the
26 incorporation of visual 48 and sound 50 indicators to inform a
27 user concerning operations that need to be accomplished. These
28 can function either off or on line. For example, the alarm/sound
29 indicator 50 can be programmed to sound, and/or the visual
30 indicator can light if the device 10 is programmed to connect the
31 camera to the network at a specific time and there is no
32 connection. The indicators can also give notice when the image
33 storage has reached a certain level. A visual display 52 is
34 optional for presentation of useful information such as the
35 remaining number of images to be sent to a destination 18, the
36 remaining time required for transmission, notice of connection to
37 a camera 12, and notice of connection to a destination 18.

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1   Internally, the device 10 includes a counter to maintain the image
2   count for display as discussed above, and may optionally also
3   include a clock for use in indicating the date and time of
4   receiving an image on the display 52.
5   An alternate construction 54 of a device that is functionally
6   similar to device 10 is shown in Fig. 2 wherein the connection
7   from the device 54 to a camera 56, or to the PC 14 is made through
8   a removable storage interface such as a PCMCIA card, SamrtMedia
9   CompactFlash Clik! Card, etc. For example, a PCMCIA card 36 can
10   be placed in the camera card slot 58 and camera data can be
11   downloaded to the card 36. The card 36 can then be placed in the
12   device 54 slot 60, and the camera data can be loaded into the
13   device 54 for processing and transmission through connection 62 to
14   a destination 20. An alternate embodiment is also indicated in
15   Fig. 2, wherein a PCMCIA card extension 64 is provided for
16   installation in the PCMCIA card slot 58 of the camera 56. Other
17   configurations and types of connections in the design of the
18   communication device will be apparent to those skilled in the art
19   and these are to be included in the spirit of the present
20   invention.
21   Referring to Fig. 3, the internal structure of the
22   communication device 10 is shown in block form. A processor 66
23   performs operations according to specific programming generally
24   indicated by the image processing block 68, and coordinates the
25   activation of the communication device 10. Specifically noted in
26   the processor block 66 are the operations of maintaining the time
27   and date (clock 70), for inclusion with image data to indicate the
28   time and date of the image processing. The processor also keeps an
29   account of the number of images received and sent (block 72), for
30   display on the LED screen 52, and processes additional data (block
31   74) for various purposes, including user data to be included with
32   image data. In addition, the processor performs security
33   operations when programmed to do so (block 76). Typically, a ROM
34   78 is provided to store permanently programmed data, and a RAM 80
35   is used for temporary storage. Specific camera communication
36   apparatus includes a camera connection controller 82, and an
37   optional infrared transceiver 84 for a wireless connection to the

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1   camera. The camera controller 82 connects to the camera through
2   port 20 and/or the transceiver 84, and additional connective
3   hardware as indicated in Fig. 1. The network communication
4   apparatus similarly includes, in addition to the processor and
5   memory blocks, a network connection controller 86, communicating
6   with the network through line 32 and/or connected to a modem 88
7   through bus 90 and then to the network through a modem output bus
8   92 and/or a bus 94 to a transceiver 96 to the antenna/emitter 40
9   via a bus 98 for a wireless connection to the network. Similarly,
10 the camera connection controller is optionally connected via bus
11 10 to a transceiver 102 connected through bus 104 to
12 antenna/emitter 46 for communication with the camera 12. The user
13 indicators are operated through a user interface controller 108.
14 The indicators include a battery condition indicator 110, the
15 alarm light 48, the sound alarm 50, a power switch 112, and the
16 LED display 52. The power supply 114 is also indicated with
17 options including a battery 116, an AC battery charging supply
18 input 118, a phone line power connection 120 and a line 122 from
19 an alternate power bus, not shown.
20   Fig. 4 illustrates accommodation of a number of types of
21 network connections with a single communication device 124,
22 including device circuitry 126 similar to that shown in Fig. 3,
23 including a modem 128 and also an Ethernet adapter 130, a router
24 132, a hub 134, an infrared link 136 and/or any wireless
25 connection 138. The device 124 can be configured to provide
26 compatible data format for any one or more of the possible types
27 of network connections, either individually or simultaneously. In
28 the case of simultaneous output to more than one media, the device
29 124 includes a separate output for each type of connection. The
30 various selected connection types can each transmit through a
31 corresponding part of network 16 to a single computer or remote
32 network node 18, or they can each output to a different remote
33 destination, such as illustrated in Fig. 5 where output from a
34 camera 12 is sent by a communication device 140 by way of an
35 ethernet adapter 130 through a network 139 to a first remote
36 computer 142, and also by way of a wireless connection/transceiver
37 138 to a transceiver 42, through a network 141 to a second remote

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1　computer 146, or alternately to the computer 142 as indicated by

2　line 148.

3　　　　The communication devices described in this disclosure can be

4　connected to a camera by any of a variety of port types. This is

5　illustrated in Fig. 6 showing a camera 150 connected to a

6　communication device 152 by way of serial ports 154, 156, SCSI

7　ports 158, 160, IrDa ports 162, 164, parallel ports 166, 168 and

8　USB ports 170, 172 from communication device 152 to the camera

9　150. The device 152 can have any combination of outputs and other

10　features as described for communication devices elsewhere in this

11　disclosure. As shown, the device 152 has an output port 174 and

12　an optional Smart card port 176 for use with a Smart card 36. The

13　various interconnecting lines or media are simply noted as lines

14　178, each configured appropriately for the type of port. In the

15　case of infrared communication the corresponding line 178 is not a

16　physical communication cable but rather an unobstructed line of

17　view. The camera and communication device can have one or more of

18　the ports shown in Fig. 6. The spirit of the present invention

19　includes other communication lines or media between the camera and

20　communication device in addition to those shown in reference to

21　Fig. 6, and between the communication device and a remote computer

22　in addition to those illustrated in reference to Fig. 4. Such

23　variations will be apparent to those skilled in the art.

24　　　　As discussed above, the communication device of the present

25　invention provides downloading of camera images onto computerized

26　systems in an automated manner. The communication device is

27　programmed to include information about the camera, the remote

28　computer and intervening network and the corresponding method of

29　transporting the information.

30　　　　In addition to these more general features of the

31　communication device, numerous programming and operational options

32　are included in the spirit of the present invention, examples of

33　which are given in the lists of Fig. 7. The types of connections

34　from the communication device to a network were illustrated in

35　detail in Fig. 4. These options are also listed in Fig. 7 under

36　the heading "Device Connection to Network". Such connections

37　require specific ordering/arranging of data known as protocols.

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1   Typical protocols are listed in Fig. 7 under " Device to Network
2   Protocols" . A user will also often find it convenient to include
3   the camera serial number or any other unique identification, along
4   with the image information. Certain types of camera information
5   are listed under " Device Information Re Camera" , and this and
6   other camera information are programmed into a device by use of
7   the Smart card installed for example in port 34 of Fig. 1, or by
8   use of a PC by way of port 20, or from a remote computer at 18 as
9   illustrated in Fig. 1, or by other means that will be apparent to
10   those skilled in the art.
11   In the same way, information regarding the identity by the
12   particular communication device, and other information can be
13   programmed into the device. Examples include a unique
14   communication device ID, the date and time maintained by a built-
15   in clock, the number of images stored and/or downloaded, and the
16   numbers retained on a consecutive image counter in the
17   communication device. These features are also listed in Fig. 7
18   under DEVICE GENERATED INFORMATION.
19   The communication device is also programmed with information
20   concerning the destination 18, which normally will be a remote PC,
21   but could be some other apparatus such as a video monitor or a
22   printer, etc. This type of information is listed under " Device
23   Information Re Destination" in Fig. 7.
24   Requiring a user password avoids the possibility that an
25   unauthorized person will alter data. Phone number and IP address
26   data can also be loaded into the communication device, and are
27   listed under " Operational Information for Devices and/or Camera"
28   in Fig. 7. Detailed examples of operations to be performed on
29   images will be discussed in reference to Fig. 8.
30   The communication device programming also includes
31   instructions that are then sent by the communication device to the
32   camera, examples of which are listed in Fig. 7 under " Instruction
33   to Camera From Device" .
34   The purpose of the communication device is to receive
35   information from the camera and then to store it, or modify it,
36   and/or add to it according to the program and data, and send the
37   required data to the network. Examples of data received from the

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1   camera are listed in Fig. 7 under "Device Information From
2   Camera". Examples of operations performed on image data are
3   included in the list of Fig. 8. A particular embodiment includes
4   the device programmed to add identifiers to the image, such as
5   including the date and time of image acquisition, the user's name,
6   a unique camera I.D. or image I.D. and the date and time of
7   transmission. This data can be placed on the image, or in an
8   image header, or outside the image area. The communication device
9   can also be programmed to mark, i.e. watermark or finger print,
10 which are invisible marks, the images for the purpose of deterring
11 unauthorized use, and/or it can be programmed to prepare image
12 authentication data, or to encrypt the entire set of image data to
13 prevent any unauthorized person from viewing the image. For
14 example, the communication device can be programmed to store and
15 encrypt selected image data points for comparison with data from
16 corresponding locations of a questionable image at a later time.
17   It is noted in Fig. 8 that the device can also perform other
18 operations such as compressing or expanding files, and parsing
19 files and converting them to different formats.
20   The specific items listed in Figs. 7 and 8, and discussed
21 above concerning programming of the communication device are all
22 given by way of example. The basic objective of the present
23 invention is to provide a communication device that will allow a
24 digital camera to be connected to one or more types of
25 communication networks for downloading of data to, and receiving
26 data from a remote destination, which is typically a computer.
27 Details of the circuitry and programming of the communication
28 device do not need to be described in this disclosure because
29 those skilled in the art of digital apparatus will understand how
30 to design the device to perform the operations disclosed and
31 claimed herein.
32   The embodiments of the present invention illustrated above
33 are preferred embodiments. The communication device is
34 particularly useful in these forms in that it allows existing
35 digital cameras that do not have the functionality to connect to a
36 network, to be connected to any of a variety of communication
37 networks for transmission of image data and receiving

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1   instructions. Existing digital cameras do not have to be modified
2   to function with the communication device of the present invention
3   because an interconnection is made through an existing camera port
4   using the existing protocol.
5   An alternate embodiment of the present invention is
6   illustrated in Fig. 9 wherein a communication device 180 is
7   integrated inside a digital camera 182 containing a digital camera
8   section 184. The novel digital camera 182 can send and receive
9   data to and from a communication network. The camera 182 in this
10   embodiment has a serial port 186 for connection to a line 188 to a
11   PC for receiving programming data, for use in a downloading image
12   data directly to a PC, as in a conventional digital camera. The
13   camera 182 also has one or more communication ports 190 for
14   connection to one or more lines 192 to a communication network.
15   The network communication options discussed for example in
16   reference to Figs. 4 and 5 also apply to the device 180 of Fig. 9.
17   The operation of the device portion 180, and various features such
18   as the display, indicators, etc. are the same as discussed above
19   in regard to the external communication devices such as 10 or 124.
20   Port 190 is for acceptance of a Smart card 36. Other optional
21   features are not repeated in Fig. 9 for simplicity and to avoid
22   redundant discussion.
23   Fig. 10 illustrates an embodiment of the invention wherein a
24   communication device 192 is configured for connecting data from a
25   camera 194 directly to a video/TV receiver 196. This connectivity
26   allows both preview of live images from the camera as well as
27   post-view or playback of either still images, or video when
28   applicable.
29   Figs. 11 and 12 illustrate communication devices that are
30   configured for transmission to separate destinations. Fig. 11
31   illustrates a case where the camera 198 is capable of outputting
32   first and second sets of data on lines 200 and 202 respectively,
33   to a communication device 204, and wherein it is desirable to send
34   a first set of data to a first destination 206 and a second set of
35   data to a second destination 208. For example, a journalist may
36   want to send high resolution data to his private PC at destination
37   206 and send low resolution data to a potential customer for

15

1   preview at destination 208 prior to placing a purchase order for

2   the image.

3   Other applications include "escrow" security transmissions

4   where images "first data" are sent to a first location 206, and

5   other information "second data" is automatically sent to a

6   second location/recipient 208. In the case of secured images, an

7   authenticated image can be sent to a first location such as 206

8   and an image signature and/or authentication data can be sent to a

9   second location 208. Similarly, encrypted or watermarked data can

10 be sent to a first location, and original data to a second

11 location.

12   In the case where the camera cannot provide both the first

13 and second data, the second data can be prepared by the

14 communication device, as illustrated in Fig. 12. In this case,

15 the camera 210 only outputs original image data. The

16 communication device 212 is programmed to create encrypted image

17 data and/or authentication data, or include other data, and then

18 output first selected data to a first destination/location 206 and

19 a second set of data to location/destination 208.

20   As referred to in the above description, the device of the

21 present invention performs operations in an automated manner.

22 Novel methods of operation of the communication device and/or

23 integrated camera device will now be described in greater detail.

24   The communication devices described above, used in a system,

25 for example the system described in Fig. 1 wherein a programmable

26 communication device 10 interconnects a camera 12 with a

27 destination 18, or a similar system with a communication device

28 integrated with a camera as described in reference to Fig. 9,

29 provide a structure capable of automatic and intelligent

30 operation. The computerized destination 18 can be of various

31 configurations, including a single PC or a network server.

32   The method and apparatus of the present invention in

33 automatic operation has great utility when a plurality of

34 communication devices, either as separate devices or integrated

35 with a camera, are in service and attempts are made to download

36 image data. Image data requires a large memory, and downloading

37 from a number of communication devices is time consuming.

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1   Networks encountering such a load of image data can easily be
2   overloaded, requiring either large increases in network band
3   width, or a method of organizing the downloading in an automated
4   manner. Such automation is a particularly useful feature of an
5   embodiment of the present invention and is illustrated in Fig. 13
6   where three sets of cameras 214, 216, and 218 and communication
7   devices 220, 222, and 224 are connected to a single destination
8   226 through a network 228.

9   Various ways of automating the transfer of image data from
10 the cameras to the destination will be understood by those skilled
11 in the art of automation after reading the description of the
12 invention. A preferred embodiment involves programming the
13 devices 220, 222, and 224 to automatically "re-dial" for a hook-
14 up with the destination when a busy signal is received. The
15 destination simply accepts a first call and ignores subsequent
16 calls until the processing of the first call is complete. An
17 alternate method includes the destination storing the numbers of
18 the calling communication devices in the order received, and then
19 notifying the next device in line when the destination is ready
20 for accepting the next download. This approach has an advantage
21 over the re-dialing approach in guaranteeing each device its
22 priority.

23   Referring now to Fig. 14, an example is illustrated wherein a
24 communication device is programmed to perform automatic
25 operations. Block 230 (set up device) represents the programming
26 that is accomplished through use of a PC 14, Smart card 36, or the
27 computer/destination 18 through a network 16. Fig. 14 is a
28 simplified example of programmed decisions made by a communication
29 device. Details of programming for such operations are well
30 understood by those skilled in the art and therefore are not
31 described in detail.

32   The example of Fig. 14 illustrates the communication device,
33 for example device 10, programmed to query the camera
34 communication port 20 to determine if a camera is connected. The
35 communication device, for example, can be programmed to check for
36 a camera connection (block 232) at periodic intervals, or at
37 certain times of the day. If the camera is connected, the

17

1   communication device can then receive and evaluate data from the
2   camera, an operation which can be fully automatic if the camera is
3   programmed to receive and respond to commands through line 22.   If
4   not, a user can manually trigger the camera 12 to download the
5   data to the communication device.   In either the case of automatic
6   or manual download to the communication device, block 234
7   represents this function.   Block 236 indicates an option for a
8   compatible camera 12, wherein the communication device queries the
9   camera to determine what percentage of the image storage capacity
10   is filled.   If it exceeds a certain predetermined amount, for
11   example 75%, the communication device responds by instructing the
12   camera 12 to download the image data (block 234).   If not, the
13   device can continue to check for a camera connection and image
14   memory available on a periodic basis, and/or at certain times.
15   Once image data is loaded, the communication device can
16   respond to programming to perform any of a variety of operations
17   as discussed above, such as encrypting, creating authentication
18   data and relegating selected data for subsequent transmission to
19   one or more destinations.   This is indicated simply as block 238.
20   The communication device can be programmed to send the
21   relegated data at certain times.   This programming is symbolically
22   indicated by block 240, and at the programmed time the device
23   checks the output port 30 (Fig. 1) to determine if a connection is
24   made to a network (block 242).   If so, the communication device
25   further checks to determine if the destination is connected and
26   ready.   This is indicated by block 244 for a single destination
27   and by blocks 246 and 248 for two separate destinations, although
28   any number of destinations are within the scope of the present
29   invention.
30   Once the communication device determines that the destination
31   is ready, the data is transmitted as indicated by blocks 250, 252
32   and 254.   Block 250 also indicates an option indicating
33   programming of the communication device to include a unique ID
34   with the transmitted data to connect the data to a specific
35   location, i.e. database, within the destination.   The purpose of
36   Fig. 14 is primarily to illustrate automation within the
37   communication devices of the present invention.   Automation is

18

1   also possible in the destination 18, and in the camera 12 in those

2   cases where the camera 12 is programmable.

3   Fig. 15 will now be used to discuss automation within the

4   destination 18. It should also be understood that the present

5   invention includes combinations in which automation occurs in the

6   communication device, camera and destination, or in any

7   combination of the three to accomplish required programming

8   objectives.

9   Block 258 of Fig. 15 symbolizes programming of the

10 destination 18 to perform operations, examples of which will be

11 described in reference to the various blocks of Fig. 15. Block

12 260 indicates the destination determining if the communication

13 device is connected to the network. The destination can be

14 programmed to check for a connection at various intervals or times

15 of day, etc. The destination can also be programmed to respond to

16 a signal from the communication device indicating a requirement to

17 transmit data. Both of these options, either an active query to

18 the communication device or a response from the communication

19 device are included in the step indicated by block 260.

20   Once connection is established between the destination and

21 the communication device, the destination can send instructions to

22 the communication device as indicated by block 262. As with block

23 260, this action by the destination can be self initiated or in

24 response to an instruction received from the communication device

25 to send data. The data is then received by the destination (block

26 264) and processed (block 266). The communication device can be

27 either separate from the camera or integrated with it.   .

28   Fig. 16 lists examples of data that can be sent by a

29 destination to a communication device including instructions to

30 the communication device to direct the camera to take a picture at

31 a set time or at certain intervals. Account identification,

32 titles or other information can be sent for inclusion in an image

33 header, or for watermarking, etc. Operational data can be sent to

34 inform the user when and where to take a picture. A map showing

35 where to take a picture can be sent, for example, which can be

36 displayed by the user on a camera visual display, and corrective

37 notices can be sent informing the user of any problems with the

19

1   downloaded image data such as chronic underexposure, focus
2   problems, etc. The destination can also send instructions to the
3   communication device to check camera memory, download data,
4   encrypt data, etc., all controlled by the destination.

5   Upon receiving data from the communication device (block
6   264), the destination can automatically process the data according
7   to specific programmed objectives (block 266). A number of
8   possibilities are included in Fig. 16 under "Data Processing by
9   Destination". In cases where data is received in unencrypted
10 form, it can encrypt and store the data, or it can decrypt
11 encrypted data and print images automatically or archive them.
12 The destination 18 can also automatically distribute selected data
13 items to other remote locations, such as on the web, or e-mail at
14 a low resolution image for inspection prior to a sale. The
15 destination can also store authentication data of an original
16 image and create corresponding authentication data from a
17 questionable image, and compare the two sets of authentication
18 data to determine the validity of the questionable image.

19   In summary of the automatic features of the invention, the
20 destination, for example a server, can call the communication
21 device to notify it of a particular time to send data to a server,
22 for example based on local and remote network load, server
23 processing load, server storage capacity, fulfillment (printing),
24 system load, and other factors. As explained above, there may be
25 querying/handshaking between the communication device and the
26 server to determine if there are sufficient images to send, i.e.
27 to determine the space available in the image storage memory of
28 the communication device or camera-device. Alternatively, the
29 communication device can query the destination to initiate the
30 sending of data.

31   Another automatic feature of the present invention is the
32 automatic inclusion of prescribed information along with image
33 data, such information including for example, a unique ID, date,
34 time, etc. Closely related to the information included with an
35 image is a phone number or network IP received by the device or
36 camera for automatic dialing to a destination. The communication
37 device can also automatically receive images and related

20

1   information by querying the destination at preprogrammed
2   times/intervals. Another automatic feature includes automatic
3   downloading based on priority when some users have priority over
4   others.

5   Fig. 17 applies to the integrated camera-device of Fig. 9.
6   The camera-device is first programmed as indicated by block 268.
7   A picture is taken (block 270), and the programmed operations are
8   performed (block 272). The camera-device can then check memory
9   to determine if data should be downloaded (block 274). If memory
10   space is low, the camera-device will check for a network
11   connection (block 276) and alternatively also display a notice to
12   the user of low storage capacity available (block 278). Once a
13   connection is made to the network, the data is downloaded (block
14   280). In general, all of the features discussed relative to the
15   communication device 10 apply also to the camera 182 with an
16   integrated communication device 180 as illustrated in Fig. 9,
17   except for those comments that refer to the external connection
18   between the camera and the communications device.

19   Although the present invention has been described above in
20   terms of a specific embodiment, it is anticipated that alterations
21   and modifications thereof will no doubt become apparent to those
22   skilled in the art. It is therefore intended that the following
23   claims be interpreted as covering all such alterations and
24   modifications as fall within the true spirit and scope of the
25   invention.

26   What is claimed is:

CLAIMS

1.   A communication device comprising:
(a) camera communication means for sending and receiving data to and from a digital camera; and
(b) network communication means for sending and receiving said data through a network, to and from a destination device.

2.   A communication device as recited in claim 1 wherein said camera communication means utilizes an existing protocol of communication of said camera for communication to a PC, whereby said communication device is transparent to said camera.

3.   A communication device as recited in claim 1 wherein said network communication means includes a modem.

4.   A communications device as recited in claim 3 wherein said modem is connected via predefined phone numbers.

5.   A communication device as recited in claim 1 wherein said network communication means includes means for connecting to an ethernet network.

6.   A communication device as recited in claim 1 wherein said network communication means includes a network router.

7.   A communication device as recited in claim 1 wherein said network communication means includes means for establishing a wireless connection to a network.

8.   a communication device as recited in claim 1 wherein said network communication means includes means for establishing a satellite connection to a network.

9.   A communication device as recited in claim 1
wherein said destination device is a printer.

10.   A communication device as recited in claim 1
wherein said destination device is a phone switch.

11.   A communication device as recited in claim 1
wherein said destination device is a server.

12.   A communication device as recited in claim 1
wherein said communication device is programmable.

13.   A communication device as recited in claim 1
wherein said communication device has a unique
identification.

14.   A communication device as recited in claim 13
wherein said communication device sends said unique
identification as part of said data to be transmitted to said
destination device.

15.   A communication device as recited in claim 1
wherein said communication device further comprises a counter
to provide a unique identification number for image data
representing a particular image.

16.   A communication device as recited in claim 15
wherein said communication device sends said unique
identification of each said image as part of said
transmission.

17.   A communication device as recited in claim 1
wherein said communication device includes means for
providing time and date identification data indicating the
time and date of processing of each image.

18.   A communication device as recited in claim 17

23

2   wherein said communication device receives said time and date
3   identification data from the network.

1   19.   A communication device as recited in claim 18
2   wherein said communication device sends said time and date
3   identification data as part of said data transmitted to said
4   destination device.

1   20.   A communication device as recited in claim 1
2   wherein said communication device includes global positioning
3   detection apparatus.

1   21.   A, communication device as recited in claim 20
2   wherein said communication device sends global position data
3   as part of said data transmittal to said destination device.

1   22.   A communication device as recited in claim 12
2   wherein said camera communication means includes means for
3   entering data for programming said communication device.

1   23.   A communication device as recited in claim 12
2   wherein said communication device is programmed with data
3   received·from said destination device.

1   24.   A communication device as recited in claim 1
2   further comprising a Smart card port for reception of a Smart
3   card.

1   25.   A communication device as recited in claim 12
2   wherein said communication device is programmable to receive
3   camera operational parameter data and to send said camera
4   operational parameter data to a camera connected to said
5   communication device.

1   26.   A communication device as recited in claim 12
2   wherein said communication device is programmable to
3   watermark image data received from a camera.

24

27. A communication device as recited in claim 12 wherein said communication device is programmable to encrypt image data received from a camera.

28. A communication device as recited in claim 12 wherein said communication device is programmable to form image authentication data.

29. A communication device as recited in claim 1 wherein said network communication means is for sending data to a plurality of network destination devices.

30. A communication device as recited in claim 1 further comprising a visual display for indicating the progression of said sending data.

31. A communication device as recited in claim 30 wherein said visual display indicates a remaining number of images to be sent.

32. A communication device as recited in claim 30 wherein said visual display indicates remaining time for transmission.

33. A communication device as recited in claim 30 wherein said visual display indicates established connection to the camera.

34. A communication device as recited in claim 30 wherein said visual display indicates established connection to said destination device.

35. A communication device as recited in claim 1 wherein said camera communication means includes a serial port.

25

36. A communication device as recited in claim 1 wherein said camera communication means includes a parallel port.

37. A communication device as recited in claim 1 wherein said camera communication means includes a SCSI port.

38. A communication device as recited in claim 1 wherein said camera communication means includes a USB port.

39. A communication device as recited in claim 1 wherein said camera communication means includes an infrared port.

40. A method for transmitting digital data from a camera to a destination device said method comprising:
(a) performing operations by use of a· communication device, said operations including
(i) sending said digital data from a camera to said communication device; and
(ii) structuring said camera data within said communication device to a compatible protocol for transmission through a network to a communication network to a destination device.

41. A method as recited in claim 40 wherein said destination device is a computer.

42. A method as recited in claim 40 wherein said destination device is a computer.

43. A method as recited in claim 40 wherein said destination device is a network.

44. A method as recited in claim 40 wherein said destination device is a printer.

45. A method as recited in claim 40 wherein said operations further include

(a) encrypting said digital camera data to form encrypted camera data; and

(b) structuring said encrypted data to a compatible protocol for transmission through a network to a destination device.

46. A method as recited in claim 40 wherein said operations further include

(a) creating authentication data; and

(b) structuring said authentication data to a compatible protocol for transmission through a network.

47. A method as recited in claim 40 further comprising programming said communication device to add additional data for transmission with said camera data to a network.

48. A method as recited in claim 40 further comprising:

programming said communication device with operational instructions for transmission to said camera.

49. A method as recited in claim 40 further comprising:

programming said communication device for encryption of camera data.

50. A method as recited in claim 40 further comprising:

programming said communication device for creating authentication data.

51. A method as recited in claim 40 further comprising:

programming said communication device for watermarking of camera data.

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52. A method as recited in claim 40 further comprising:

programming said communications device for fingerprinting data.

53. A method as recited in claim 50 further comprising:

(a) transmitting unencrypted digital camera data to a first said destination device; and

(b) transmitting said authentication data to a second said destination device.

54. A method for transmitting digital camera data comprising:

(a) uploading said digital camera data from a camera to a communication device; and

(b) structuring said camera data within said communication device to a compatible format for transmission and display of said digital camera data on a video/TV receiver.

55. A digital camera comprising:

(a) means for converting light to digital image data;

(b) port means for receiving and sending digital data;

(c) means for transmitting and receiving said digital data to and from a destination device by way of a communication network; and

(d) means for automatically performing one or more programmed operations upon occurrence of a condition.

56. A digital camera as recited in claim 55 further comprising means for securing said digital image data.

57. A digital camera as recited in claim 56 wherein said programmed operations include said transmitting said data.

58.   A communication device as recited in claim 1
further comprising means for automatically performing a
programmed operation upon occurrence of a condition.

59.   A communication device as recited in claim 58
wherein said programmed operation is receiving of image data
from a camera and performing an operation in response to
receiving said image data.

60.   A communication device as recited in claim 58
wherein said condition is an instruction received from a
destination by way of said network.

61.   A communication device as recited in claim 58
wherein said condition is a specific time to perform said
operation.

62.   A communication device as recited in claim 58
wherein said condition is slow traffic on the network.

63.   A communication device as recited in claim 58
wherein said operation is sending data to said network.

64.   A communication device as recited in claim 58
wherein said condition is a predefined amount of camera
memory capacity available for storage of additional image
data.

65.   A communication device as recited in claim 58
wherein said operation is receiving additional information
from a remote destination.

66.   A communication device as recited in claim 65
wherein said additional information is for accompanying
specific image data.

29

67. A communication device as recited in claim 65 wherein said additional information is operational instructions.

68. A communication device as recited in claim 58 wherein said operation is connecting to a network.

69. A communication device as recited in claim 58 wherein said operation is disconnecting from a network.

70. A communication device as recited in claim 61 wherein said operation is taking a picture.

71. A communication device as recited in claim 61 wherein said operator is downloading said data to said destination device.

72. A communication device as recited in claim 61 wherein said operation is uploading data from said destination device.

73. A communication device as recited in claim 72 wherein said data includes a camera ID and account number.

74. A communication device as recited in claim 73 wherein said operation further includes downloading said camera ID and account number upon occurrence of a second condition.

75. A communication device as recited in claim 1 further comprising a ROM programmed for a specific purpose.

76. A communication device as recited in claim 75 wherein said specific purpose is to restrict downloading to a specific destination.

77. A communication device as recited in claim 1

30

2   further comprising visual display means for indicating

3   operation status.

1   78. A communication device as recited in claim 77

2   wherein said display means indicates when said device is

3   programmed to connect to a network, and indicate when a

4   network connection is made to said device.

1   79. A digital camera as recited in claim 57 wherein

2   said condition includes said camera receiving a signal from

3   said remote destination.

1   80. A digital camera as recited in claim 57 wherein

2   said condition includes said camera programmed to perform a

3   said operation at a specific time.

1   81. A digital camera as recited in claim 57 wherein

2   (a) said means for securing includes means for

3   creating encrypted data from said digital image data;

4   (b) said programmed operations further include said

5   securing, and said transmitting; and

6   (c) said digital data includes information to be

7   transmitted to said destination.

1   82. A digital camera as recited in claim 81 wherein

2   said digital data includes

3   (a)   camera identification data; and

4   (b)   user identification data.

1   83. A method as recited in claim 40 further

2   comprising:

3   said communication device automatically responding to

4   one or more conditions by performing one or more programmed

5   operations.

1   84. A method as recited in claim 83 wherein

2   (a) said programmed operation is said transmitting;

31

3   and

4   (b) said condition includes a signal from said
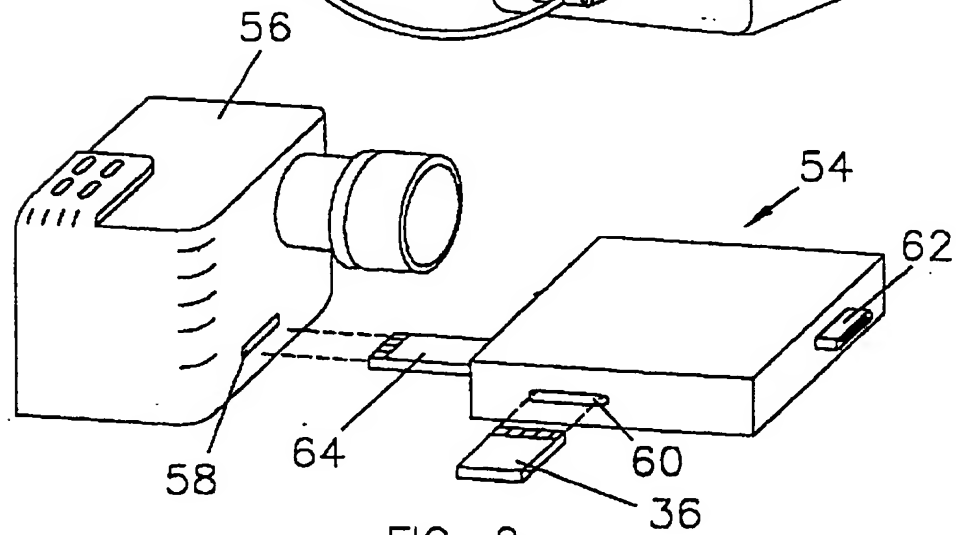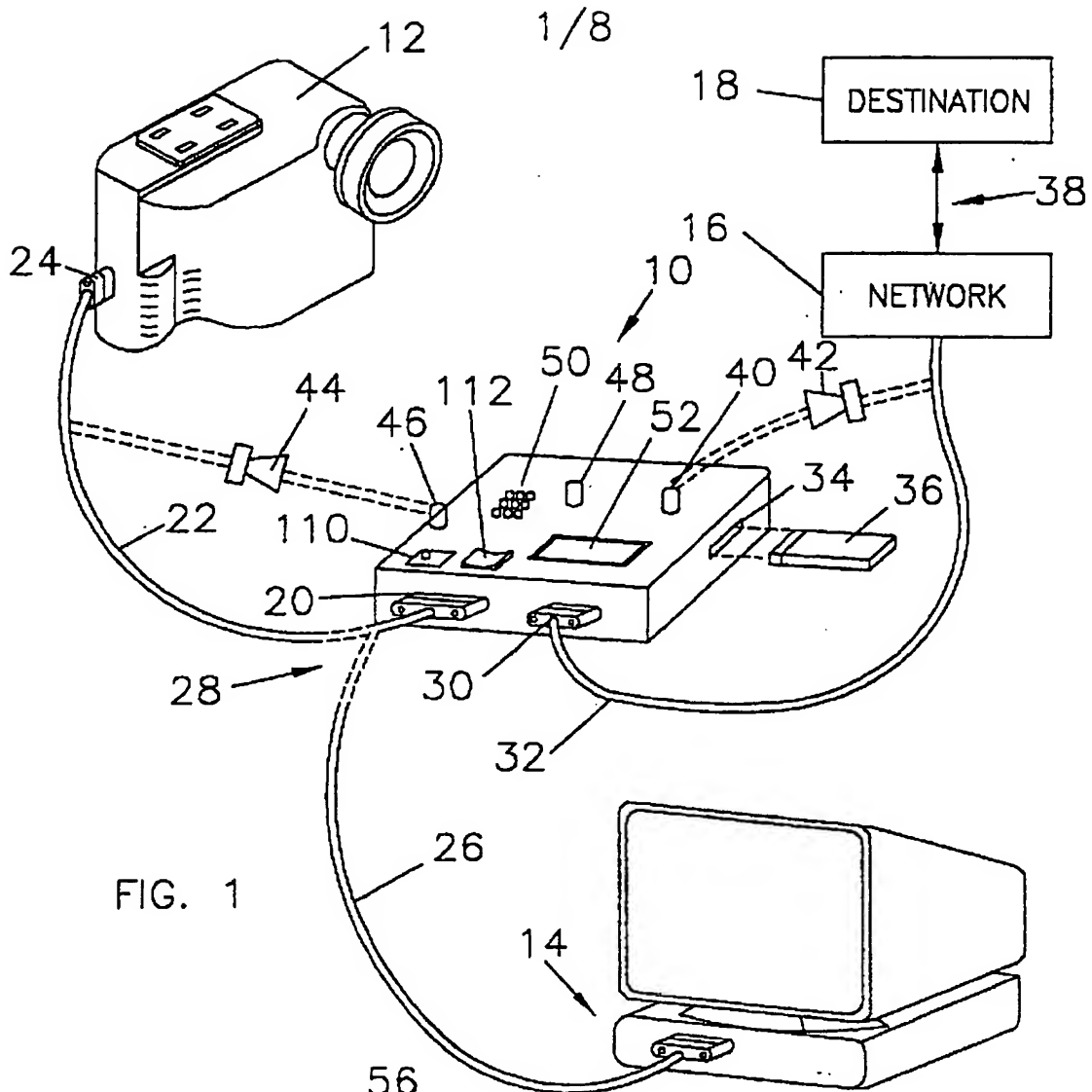
5   destination.

1   85. A communication device as recited in claim 1

2   further comprising means for including identification of a

3   camera that secured a particular image along with said data

4   representing said particular image.

1   86. A digital camera as recited in claim 55 further

2   comprising means for including identification of said camera

3   along with said data representing said particular image.

1   87. A method as recited in claim 40 further comprising

2   means for including identification of a camera that secured a

3   particular image along with said data representing said

4   particular image.

1   88. A method as recited in claim 40 further comprising

2   means for including a unique number with each group of said

3   digital data representing a particular image.

1   89. A digital camera as recited in claim 86 further

2   comprising means for including a unique number with each said

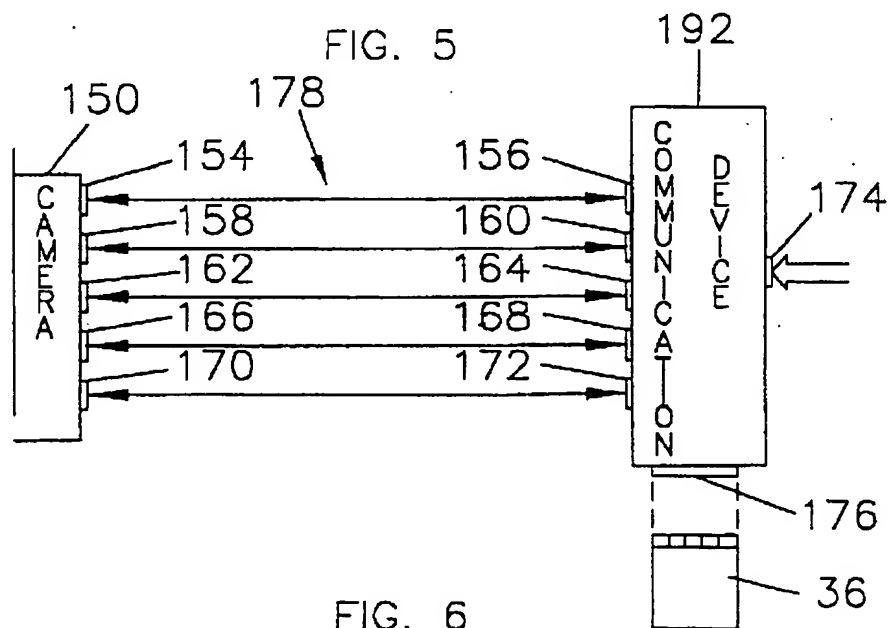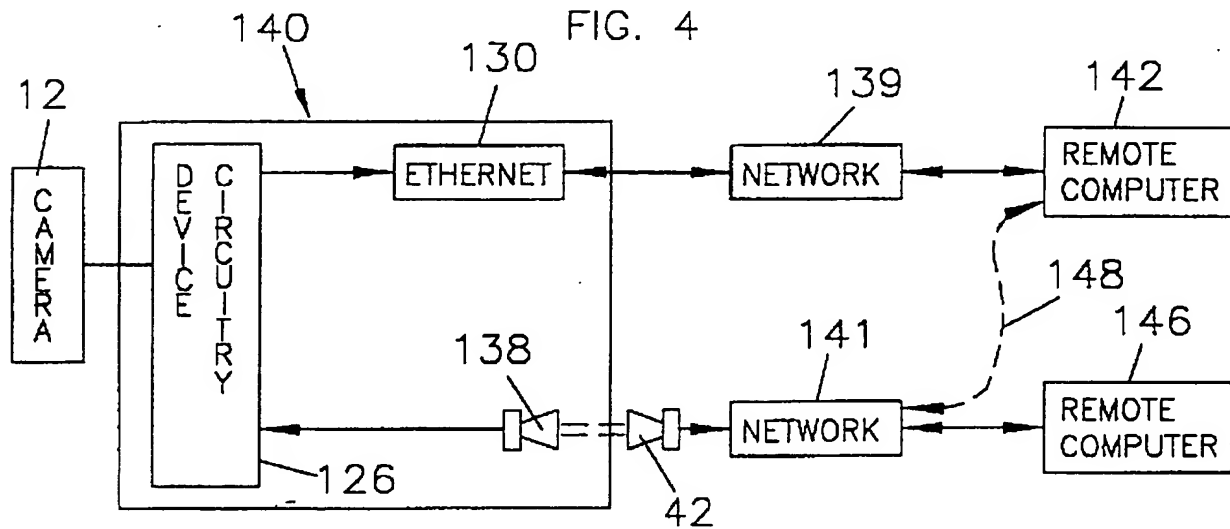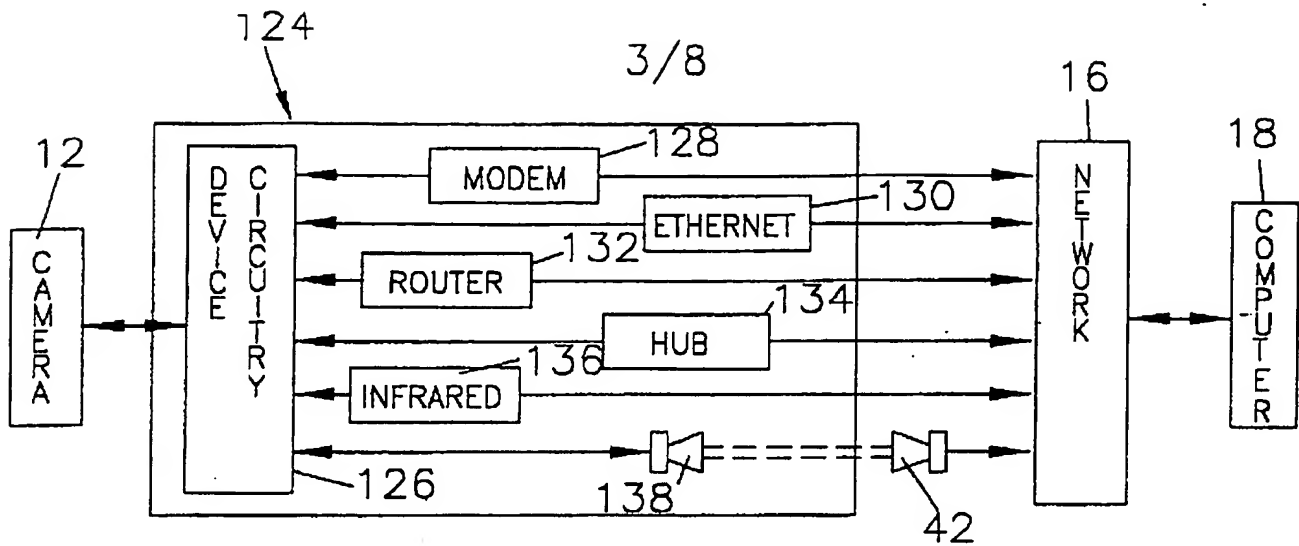3   data representing said particular image.

1/8

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

DEVICE CONNECTION TO NETWORK
* TELEPHONY (MODEM) CONNECTION
* ETHERNET CONNECTION
* ROUTER
* HUB
* INFO-RED CONNECTION
* CELLULAR CONNECTION
* UNLICENSED WIRELESS
  . FREQUENCIES
* SATELLITE COMMUNICATION
ETC.
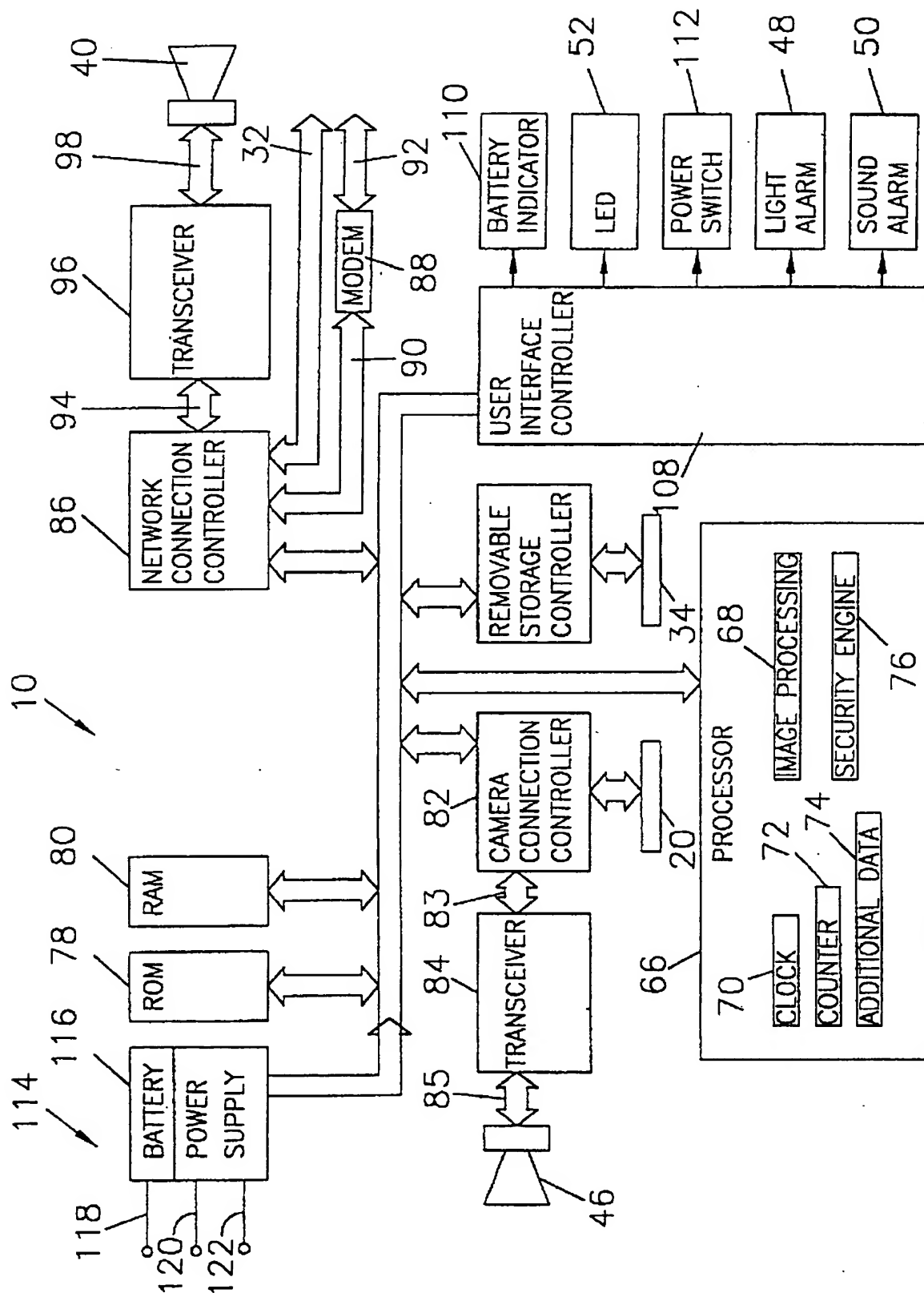
DEVICE TO NETWORK PROTOCALLS
* TCP/IP
* MAIL CLIENT
* CORBA/110P
* X-MODEM
* Z-MODEM
ETC.

DEVICE INFORMATION RE CAMERA
* CAMERA SERIAL NUMBER
* USER NAME
* DATE AND TIME OF TRANSMISSION
ETC.

DEVICE INFORMATION FROM CAMERA
* IMAGES
* VOICE ANNOTATION
* OVERLAY ANNOTATION
* DATE AND TIME OF CAPTURE
* USER NAME OF PHOTOGRAPHER
ETC.

DEVICE INFORMATION RE DESTINATION
PHONE NUMBER
IP ADDRESS
USER ACCOUNT NAME
USER LOGIN
USER PASSWORD
ETC.

OPERATIONAL INFORMATION FOR DEVICE AND/OR CAMERA
* PHONE NUMBER TO CALL
* IP ADDRESS
* OPERATION TO BE PERFORMED ON IMAGES
* PASSWORD (E.G. PUBLIC KEY PASSWORD)
ETC.

DEVICE GENERATED INFORMATION
* UNIQUE DEVICE ID
* TIME AND DATE
* NUMBER OF IMAGES PROCESSED/RECEIVED

INSTRUCTION TO CAMERA FROM DEVICE
* LIVE IMAGE
* TAKE IMAGE
* DELETE IMAGES
* CHANGE CAMERA RESOLUTION
* CHANGE FILE FORMAT
* TURN FLASH ON/OFF
* REMOTE FOCUS
* WHITE BALANCE
* APPLICATION OF DIGITAL FILTERING ON THE IMAGES WHILE CAPTURING THE IMAGES
* REMOTE OPTICAL ZOOMING
* REMOTE OPTICAL EXPOSURE (CHANGE F-STOP, BRACKET IMAGE EXPOSURE TIME ETC.)
* REMOTE DIGITAL EXPOSURE (CHANGE GAIN, OFFSET, CCD EXPOSURE TIME ETC.)
* DIGITAL ZOOMING
* SELECTION OF ROI (E.G.FOR DIGITAL ZOOMING, IMAGE PROCESSING, FILTERING ETC.)
ETC.

FIG. 7

DEVICE OPERATIONS ON IMAGE DATA

OPERATING ON FILES:
- COMPRESSING/EXPANDING FILES
- PARSING FILES AND CONVERTING TO DIFFERENT FORMATS

PERFORMING IMAGE ENHANCEMENT OPERATIONS SUCH AS:
- AUTOMATIC COLOR CORRECTION
- RESAMPLING
- SHARPENING
- ROTATION
- GENERIC IMAGE FILTERING

ETC.

ADDING IDENTIFIERS TO THE IMAGES SUCH AS:
- STAMPING THE DATE AND TIME ON THE IMAGE
- ADDING THE USER'S NAME
- ADDING CAMERA UNIQUE ID
- ADDING AN IMAGE UNIQUE ID
- ADDING THE TIME AND DATE OF TRANSMISSION

SECURE THE IMAGE VIA:
- WATERMARKING IMAGES
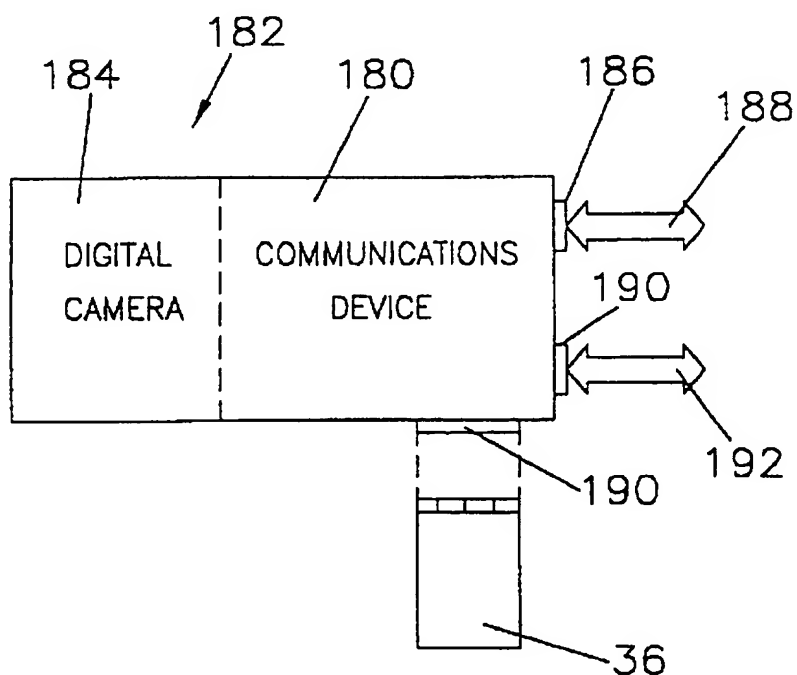- AUTHENTICATING IMAGES
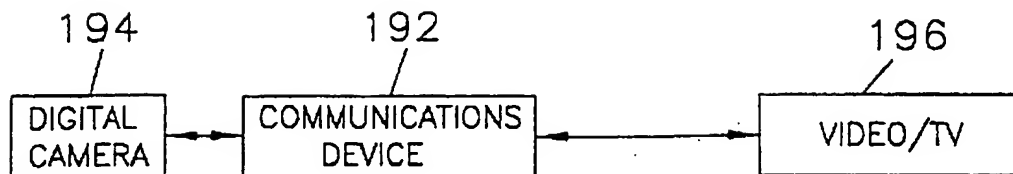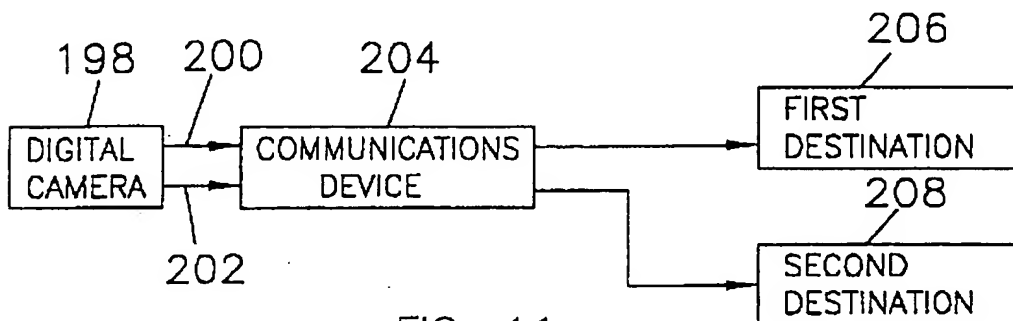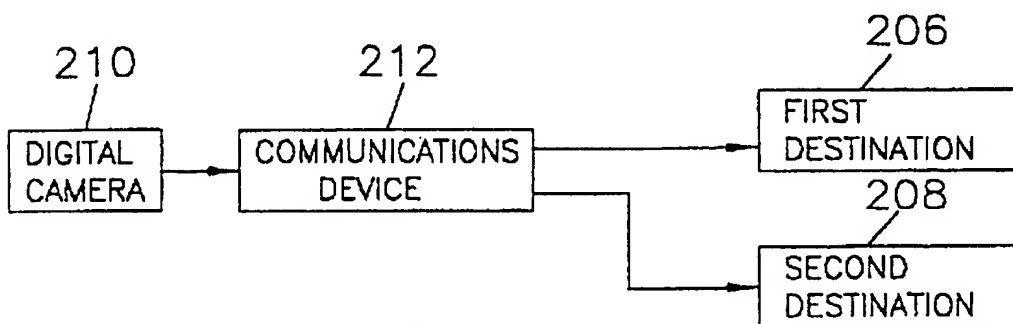- ENCRYPTION IMAGES

FIG. 8

FIG. 9

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194   192   196

| DIGITAL CAMERA | ↔ | COMMUNICATIONS DEVICE | ← | VIDEO/TV |

FIG. 10

198   200   204   206

FIRST DESTINATION

| DIGITAL CAMERA | → | COMMUNICATIONS DEVICE |

202   208

SECOND DESTINATION

FIG. 11

210   212   206

FIRST DESTINATION

| DIGITAL CAMERA | → | COMMUNICATIONS DEVICE |

208

SECOND DESTINATION

FIG. 12

214   220   228   226

| CAMERA 1 | ↔ | COMMUNICATIONS DEVICE 1 | ↔ |
216
| CAMERA 2 | ↔ | COMMUNICATIONS DEVICE 2 | 222 | NETWORK | ↔ | DESTINATION |
218
| CAMERA 3 | ↔ | COMMUNICATIONS DEVICE 3 | 224 |

FIG. 13

SUBSTITUTE SHEET (RULE 26)

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FIG. 14

258

SETUP DESTINATION

262

SEND DATA TO
COMMUNICATIONS DEVICE

260

IS COMMUNICATIONS
DEVICE CONNECTED?

264

RECEIVE DATA FROM
COMMUNICATIONS DEVICE

NO   YES

266

PROCESS DATA
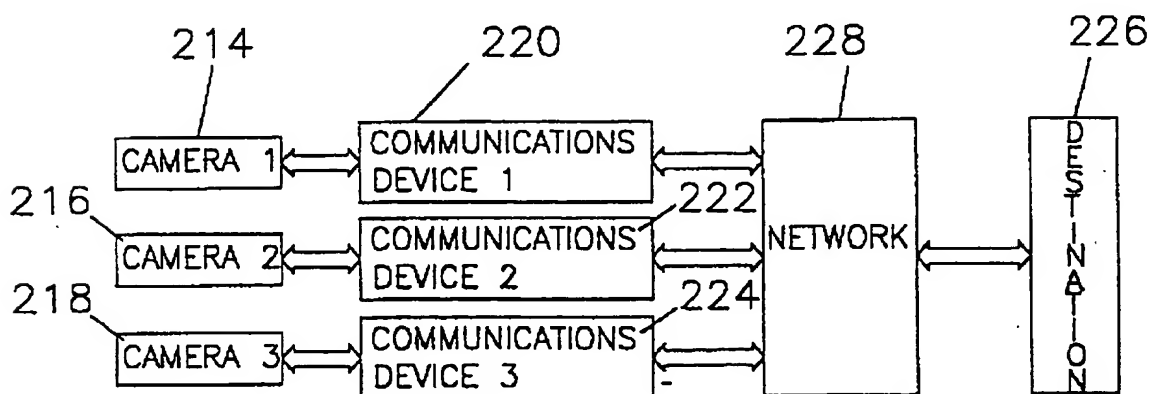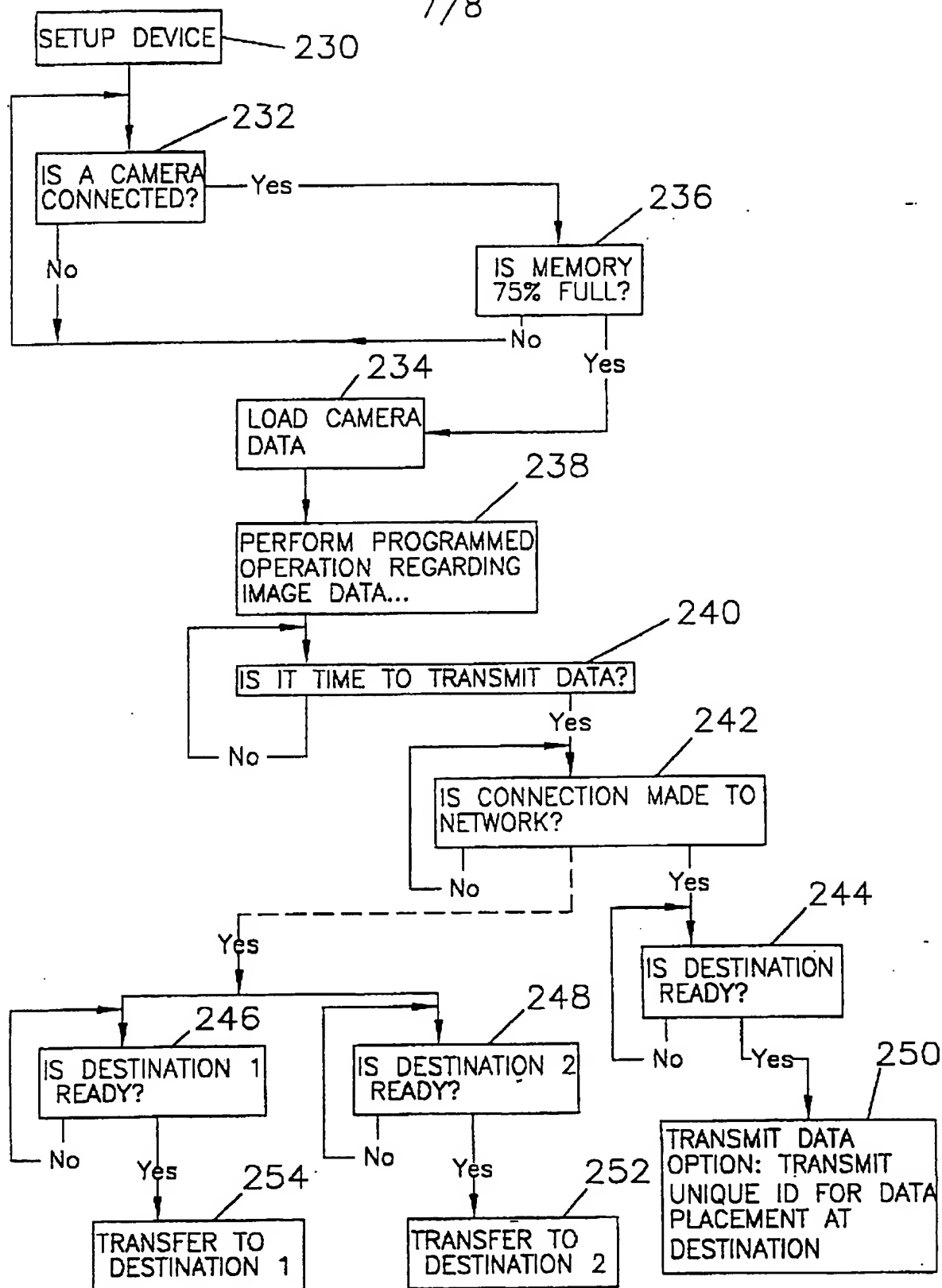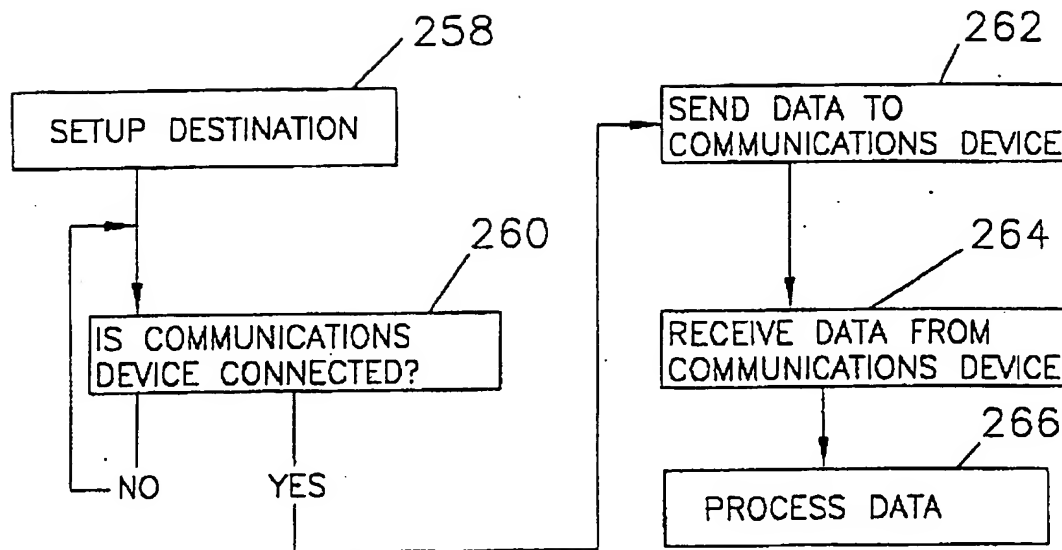
FIG. 15

DATA FROM DESTINATION TO DEVICE

1. TAKE A PICTURE AT A SET TIME
   OR AT INTERVALS.
2. FOR IMAGE HEADER, ETC.
   A) ACCOUNT ID
   B) TITLE
   C) NAME , ADDRESS, ETC.
3. OPERATIONAL DATA
   A) WHERE TO TAKE A PICTURE
   B) MAP OF LOCATION
   C. CORRECTIVE NOTICES
4. INSTRUCTION TO DOWNLOAD DATA

DATA PROCESSING DETINATION

1. ENCRYPT AND STORE DATA
2. DECRYPT DATA AND PRINT IMAGE
3. ARCHIVE THE IMAGE
4. SEND IMAGE DATA TO REMOTE LOCATION
5. PLACE IMAGE DATA ON THE WEB
6. SEND DATA BY E-MAIL WITH LOW
   RESOLUTION OF IMAGE
7. SEND DECRYPTED IMAGE TO A FIRST
   DESTINATION
8. SEND AUTHENTICATION DATA TO A
   SECOND DESTINATION
9. COMPARE QUESTIONABLE IMAGE DATA
   FROM A THIRD SOURCE WITH
   AUTHENTICATION DATA AND DISPLAY THE
   RESULT

FIG. 16